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Circular Economy in Vietnam's Small and Medium-Sized Enterprises: Assessment of Current Practices, Barrier Analysis, and Strategic Policy Directions (2020–2025)

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Abstract: *The transition to a Circular Economy (CE) has become essential for Vietnam as the country pursues its net-zero commitment by 2050, yet the readiness and capability of small and medium-sized enterprises (SMEs) which form the backbone of the national economy remain unclear. This study aims to assess the status, barriers, and strategic pathways for CE adoption among Vietnamese SMEs. A scoping review of 188 scientific publications and authoritative datasets from the World Bank, OECD, UNDP, and VCCI was conducted, supplemented by policy analysis of the Law on Environmental Protection (2020), Decree 08/2022/ND-CP on Extended Producer Responsibility (EPR), and the National CE Action Plan. The results show that although Vietnam's regulatory environment has progressed rapidly, CE practices among SMEs remain fragmented due to limited long-term finance, technological constraints, compliance burdens, and underdeveloped secondary material markets. At the same time, emerging business models such as Thanh Long Bioplastics, Lagom Vietnam, and ReForm Plastic demonstrate the potential for innovation when local resources, partnerships, and dynamic capabilities align. The study concludes that advancing CE adoption will require an integrated strategy focused on strengthening institutional clarity, expanding green financing instruments, enhancing technological ecosystems, and developing formal markets for secondary resources, thereby enabling SMEs to play a transformative role in Vietnam's circular and low-carbon development pathway.*

Keywords: Circular economy; Small and medium-sized enterprises (SMEs); Vietnam; Dynamic capabilities; Extended Producer Responsibility (EPR); Green finance; Secondary material markets; Environmental policy.

1. Introduction

Vietnam's economy has been evolving rapidly over the last 30 years, with large portions of its economy transitioning from agriculture. As a result, the country has become one of the leading manufacturing and exporting economies in Southeast Asia, with GDP growth of 6.1% and 6.5% expected in 2023 and 2024, respectively. Regardless of the positive developments in the economy, there has been a continuation of a linear growth model in the economy, which involves a 'take–make–consume–dispose' approach, resulting in vast amounts of damage to the environment, such as depletion of the country's resources, the degradation of air quality, and the amplification of Vietnam's poor waste management record. Currently, the waste management sector is one of the country's major problems, with over 60,000 tons of solid waste being produced each day. The country's strong and relatively new eco-trade agreements with global powers, such as the EU, requires Vietnamese exporters to adopt eco-friendly business practices. Consequently, the CE is no longer an optional environmental consideration, and rather an economic one, dependent upon the innovative efficiency of SMEs. Though representing more than 97% of the registered firms in Vietnam, employing 60% of the workforce, and accounting for nearly 40% of the GDP, the Vietnams' SME are the most economically vulnerable during the green transition as they encounter Financial and technological "resource" constraints that limit their ability to innovate, engage and integrate in higher value supply chains. Therefore, the current challenges and transition pathways of SMEs are very relevant, and this study seeks to understand the current systemic barriers to the SMEs adoption of the CE and devise targeted recommendations to the Vietnam context.

2. Theoretical Foundations and Analytical Framework

Definition and Core Principles of the Circular Economy

The circular economy (CE) is widely defined as an economic and industrial system aimed at maintaining the value of products, materials, and resources for as long as possible by closing material loops and minimizing waste (European Commission, 2015). Instead of the traditional linear model of "take–make–dispose," CE emphasizes regenerative resource flows, renewable energy use, and non-toxic material cycles (Ellen MacArthur Foundation, 2013). CE practices extend beyond recycling and include the full "9R Framework"—Refuse, Rethink, Reduce, Reuse, Repair, Refurbish, Remanufacture, Repurpose, Recycle, and Recover (Kirchherr et al., 2017).

Vietnamese SMEs may however be implementing the 'reducing' and 'reusing' practices as the OECD suggests and shaped at the lower end of the more refined circular economy which include rotating practices like remanufacturing and regenerative design (2020). Even in terms of the circular economy, there is very little sign of SMEs in Vietnam advanced in the optimization of resources

and efficiency, suggesting the consideration of a more fundamental transformation of the underlying business model.

Dynamic Capability Theory in the Context of SMEs

As it considers the way firms build and reconfigure internal competencies over the changing environmental context, Dynamic Capability Theory is useful for understanding the transition of SMEs to adopting circular business models. For Teece, (2007), the focal points of the dynamic capabilities include, sensing opportunities and threats in the environment, seizing these opportunities through investing and innovating, and restructuring the organization in a way that will retain a competitive edge by altering the processes that are used and the resources in order to make a shift in the end goal.

In the context of Vietnamese SMEs, such capabilities involve the absorption of regulatory changes such as EPR, the opening of opportunities, and the turning of internal processes towards sustaining green innovations towards adaptive production eco-designs. For SMEs in Southeast Asia, there is evidence in the literature suggesting that Leadership, Learning, and Collaborative networks are the more critical factors in the adoption of CE as compared to the available finances (World Bank, 2022; OECD, 2020). This corresponds with much of the much evidence around the world that supports the idea that having the right capabilities is what enables the firm to implement CE practices (Frishammar & Parida, 2019) seamlessly.

Legal and Policy Framework Supporting Circular Economy Development in Vietnam

As far as Vietnam's CE policies are concerned, they have undergone proxies of significant changes after the Year 2020. The Law on Environmental Protection (LEP) 2020 was the first to legislatively entrench CE in the country and was the first in the country to have a complete break with end-of-pipe Environmental Management towards life-cycle Governance (Vietnam National Assembly, 2020). The law provides for the circulation of practices around waste management, resource efficiency, and producer responsibility.

Decree 08/2022/ND-CP, the law that operationalizes LEP 2020, is the first to provide in detail the guidelines for Extended Producer Responsibility (EPR) with a minimum recycling rate and deadlines, and other compliance regulations. This also provides eco-innovative enterprises access to the Vietnam Environmental Protection Fund, thereby, enhancing their land- and capital-use efficiency as they gain faster access to government land for intended environmentally beneficial projects.

Decision 687/QĐ-TTg (2022) establishes the national roadmap for CE development, encouraging pilot models across agriculture, industry, and municipal waste management. In 2024, the Government issued the National Action Plan on Circular Economy, setting measurable targets for 2030—such as reducing material and energy intensity and raising urban waste recycling rates to 95%.

Collectively, these legal instruments mark a transition from voluntary green initiatives to a regulatory environment in which CE compliance becomes mandatory, particularly for resource-intensive sectors.

Research Methodology

This study adopts a scoping review to understand the fragmented cross sectoral and technological narratives on circular economy (CE) practices among Vietnam SMEs. The scoping review approach is useful to understand the methodological challenge of cross sectoral and technological integration. The literature was retrieved from Scopus, Web of Science, ScienceDirect, and Wiley Online Library based on the keywords of "circular economy," "SMEs," "Vietnam," "recycling," and "industrial symbiosis." Relevant policy documents from the World Bank, UNDP, OECD, IFC, VCCI, Vietnam's Law on Environmental Protection (2020), Decree 08/2022/ND-CP, and National CE Action Plan (2024) were also reviewed. From the 188 sources that were identified, 84 documents were selected for in-depth review based on screening criteria.

The qualitative content analysis of the data was based on a combination of deductive and inductive coding based on the CE literature, Dynamic Capability literature, and the sectoral evidence and case studies. The consistency among different datasets on the reporting of the biomass, recycling, and construction waste flow triadic relations. The approach is useful in creating a detailed account of the patterns of CE adoption, the challenges in different sectors, and the policy landscape in the Country.

Study Limitations

While conducting this research, there were some limitations with respect to this study. Since only secondary data were used, there may be inconsistencies in some of the sectoral indicators like recycling efficiency, biomass estimates, performance of wastewater treatment, and so on, across the different sources and time periods. Also, there is a lack of empirical research regarding CE adoption in the case of Vietnamese SMEs, meaning less generalization of the findings to other sectors and other sizes of companies. Furthermore, the design of the study in the form of a scoping review does not make it possible to draw causal conclusions, but only to detect certain patterns, to identify gaps, and to outline the themes of new research. These study limitations make it clear that future studies should be used to primary data collections within a structured framework with longitudinal study, and other advanced quantitative methods to build a solid empirical foundation that will guide research on CE policy.

Analytical Framework

The combined use of the principles of Circular Economy, Dynamic Capability Theory, and the specific sector material flow datasets outline the specific way in which the small and medium-scaled enterprises (SMEs) are able to transition to a Circular Economy. Because of the principles of CE, it is possible to gain and use a structural perspective to ascertain cycles of resources, reduction of waste, and regeneration of materials. On the other hand, the theory of Dynamic Capability adds a perspective at the organizational and behavioral levels, detailing the ways in which SMEs are able to detect changes in regulations and markets, innovate and adapt to process changes to accommodate new practices that allow the embracement of circularity. These different theories, alongside some of the empirical measures, such as specific recycling rates of polymers, regional bio-mass generation, wastewater treatment and its recovery, and construction waste recovery, allow the creation of a multi-tiered framework of analysis.

At the macro level, the framework assesses the evolving policy landscape and the institutional preparedness of Vietnam. At the meso level, it assesses the sectoral characteristics and the technology. At the micro level, it provides analysis of relevant case studies detailing how enterprises develop and adapt to principles of CE. This framework offers a comprehensive analysis of the complexities and the transition pathways for SMEs in the circular economy in Vietnam.

3. Current Status of Circular Economy Adoption Among SMEs

3.1. Overview of Awareness and Readiness

Analyzing the data provided by the 2023 PCI and PGI developed by VCCI and USAID, it is clear there is a wide gap in the environmental awareness and preparedness of the Vietnamese Enterprise. Environmental awareness is improving in all sections of the country; however, the number of SMEs that are committed to the active investment in the adoption of environmentally friendly technologies, for the time being, is still limited. More recently, surveys have shown that in 2024, the expected introduction of new products and/or new operational processes planned by small enterprises in Vietnam is 44%. On the other hand, the operational investments of enterprises in artificial intelligence (AI) have significantly increased in the last two years to 44%, indicating that there is some alignment of optimizations with the potential for green transformation. For environmental management preparedness, the Red River Delta is ranked first while the Mekong Delta is in the second position, indicating the variability in the quality of the local governance. Quang Ninh Province, Da Nang, Dong Nai, and Hai Phong are classified as “green growth hubs” where the local governments are supportive of the businesses with documented administrative adaptations to a more simplified informal cost structure and more effective management of the ecosystem. It is these differences that show that the adoption of the CE is more complex than the capabilities of the enterprises. 3.2. Sectoral Analysis of Circular Economy Practices.

3.2. Sectoral Analysis of Circular Economy Practices

Agriculture and Food Processing: Pioneers in Biomass Utilization

Vietnam's agriculture is the country's strongest sector for development in terms of circular economy, mainly because of its extensive biomass resources. According to the MONRE and FAOSTAT, Vietnam produces between 160 to 170 million tons of agricultural residues every year. This includes, but is not limited to, 45 million tons of rice straw, 9 to 10 million tons of rice husk, 4.5 million tons of bagasse, and almost a million tons of coffee husk. From this, only 52% of the agricultural by-products are turned into valuable resources, including energy, compost, animal feed, and other bio-based products. The rest are incinerated, which not only causes air pollution but also represents the loss of valuable economic assets. The production of biomass is not uniform throughout the Mekong Delta, which produces almost 60 million tons of residue every year, followed by the Red River Delta with 28 million tons and the Central Highlands with about 12 million tons. These differences also emphasize the growing opportunities for circular agriculture and the adoption of several technologies, including biogas digesters, biomass energy, and agricultural waste recycling. Despite the presence of several established models, there is less circular agriculture practice in most regions of the country. This leaves a lot of potential unexploited.

Plastics and Packaging: Strongest Pressure for Transition Under EPR

The Vietnamese segmentation recycling system lags with efficiency plummeting due to structural issues, such as high dependence on the informal sector and extremely poor recycling rates. WWF (2022) posits that the estimated annual plastics consumption in the industrial sector is approximately 5.9 million tons, with 3.9 million tons forming the plastic waste in the country. With regards to the polymer, the recycling rate is as follows; PET- 29 to 32 percent, HDPE- 12 to 15 percent, PP- 7 to 10 percent, LDPE- less than 5 percent with the recycling of PVC and PS being practically nonexistent. More than 70 percent of recovered plastics are recycled with less efficient technologies, often exposed to the environment and of informal nature. On the other hand, the domestic need for high quality recycled other plastics, and to a greater extent, food grade PET, HDPE, and PP, is 800,000 tons annually disregarding the fact that the country only satisfies 20% of the demand. The release of EPR (Extended Producer Responsibility) regulations will only widen the gap as the need to get more plastics recycled with the EPR estimates of 2030 producing 350,000 - 400,000 tons annually of recycled plastic forming another gap in the demand.

Vietnam's recycling system needs to be formalized, and these figures clearly state the urgency and tremendous economic potential. This potential can be realized if we address the technological and regulatory barriers.

Textiles and Footwear: Pressures from Global Supply Chains

Vietnam has one of the biggest exporters of textiles and footwear, has vast environmental repercussions and thus, considerable circular economy potential. The industry consumes almost 1.6 billion cubic meters of water annually and generates a significant amount of wastewater, especially from dyeing and finishing. Conventional dyeing uses around 70 to 120 liters of water for every kilogram of fabric, while advanced Zero Liquid Discharge (ZLD) systems reduce water usage to 85 to 98 percent through near-total water recycling. Although ZLD systems come with a higher operational cost of around USD 0.55 to 0.70 per cubic meter, with USD 0.35 to 0.45 for conventional treatments, they often recoup their costs through savings in water usage and lower environmental compliance costs. Unfortunately, more environmentally and economically sustainable technologies have only been adopted by a few large enterprises, especially FDI. Closed loop fabrics (recycled polyester, reclaimed cotton) comprise only 3 percent of domestic production, even though more than 60 percent of international brands sourcing from Vietnam have published sustainability commitments that will be mandatory by 2030.

This gap demonstrates the growing disparity between the global market’s expectations and the technological capabilities of Vietnamese SMEs illustrating the instance of circular innovation as both a necessary and challenging innovation for the sector

Construction: Significant Potential Yet Largely Untapped

The number of natural resources which the construction sector utilizes is unsurpassed, as is the amount of waste the sector generates. However, the circular adoption of this sector is still quite paradoxical. Each year in Vietnam, the construction and demolition industry generates an estimated 25 to 30 million tons of construction and demolition waste, of which a mere 12 to 15 percent gets recycled and reused as secondary aggregate, while the construction industry, still consumes 100 million tons of natural aggregate annually, primarily riverbed and mountain quarry. It is estimated that 20 to 25 percent of recycled aggregate is still obtainable to replace natural stone in urban construction, however, the adoption of this is extremely limited, primarily due to a lack of national quality standards and a lack of trust in the market. More industrial symbiosis is possible, as is the use of fly ash and slag from Thermal Power Plant as a clinker substitute in the cement industry. However, approximately 60 to 65 percent of existing industrial byproducts are still unusable due to a myriad of legal and logistical obstacles. These realities lead to the assertion that while the construction sector has a massive potential for circular transformation, paving the way for systemic response to construction in the sector to fully meet the potential, is the lack of construction in the sector.

3.3. Evaluation of Achievements and Limitations

In general, CE adoption within Vietnamese SMEs between 2020 and 2025 has developed positively, but it remains very spontaneous and fragmented. There are successful case examples of international support or cases subcontracting to large corporations, but they are not transformative on a larger scale.

This situation demonstrates the progress of the policy environment, but at the same time suggests that SMEs do not yet have the systemic and technological support, financial availability, and technological readiness to shift at scale.

4. Barriers and Challenges in the Transition Toward a Circular Economy

Small and medium-sized enterprises in Vietnam are starting to understand the positive impact the circular economy can have on their organizations; however, the lack of, and challenge of, certain structural features of the economy such as finance, technology, institutions and markets continue to barrier the more comprehensive implementation of the circular economy.

Financial Constraints

The absence of finances for implementation of the circular economy construct is deemed the foremost challenge of all other entrepreneurial complexities. Projects of the circular economy such as rooftop solar, systems of integrated closed loop circular economy (ILC) to treat wastewater systems and recyclables, and modern recycling system lines have long payback periods and require more are great for capital expenditures (CAPEX) for the solar integrated rooftop and closed loop wastewater treatment systems. The lack of longer-term maturity domestic lending of banks is a structural challenge. over 85% of loans from banks in the system of Vietnam commercial have loans that are under one year. The lack of, and challenge of, long term project financing leads to a lack of investment in the technologies required for a circular economy. Because of the scarce high-value collateral, SMEs are financially constrained despite access to credit lines, making it difficult to obtain long-term financing. Environmental and social risk evaluation models at commercial banks are misaligned or not developed at all, resulting in most of the CE-related financing classed as a “high risk” or “not bankable enough.” This means financial access is a key obstacle facing SMEs in advancing greener production systems.

Technological and Technical Barriers

Another key obstacle is the absence of technology. There is a great need for more advanced technology, for many of the recycling and waste-to-resource recovery of CE solutions. The need for advanced machinery is expensive, and most are imported from wealthier countries.

There is a lack of affordable environmentally compliant recycling machinery as there is a lack of capacity in mechanical engineering in the country. There are also some SMEs that do not focus on Research and Development (R&D) to design eco-products (eco-design), improve production systems, or create new production materials. These are the reasons why in many cases SMEs are present only in the low-value portions of circular value chains, where there are low economic gains and the technological requirements are not as stringent.

The absence of technological upgrades means that the CE adoption is not only slow but also widens the gap between SMEs and the multinationals working in Vietnam.

Institutional and Regulatory Barriers

Despite Vietnam’s progress in developing new laws and regulations for the environment, challenges remain. Administrative procedures concerning environmental permits continue to be complex and onerous. According to the 2023 PCI, land, environment, and fire safety regulations continue to be among the highest compliance costs for SMEs.

SMEs, for example, are required to prepare detailed and costly, in relation to the size of the SMEs, Environmental Impact Assessments (EIAs) to set up recycling facilities. Furthermore, the national absence of technical standards for several recycled products, i.e. food-grade recycled plastics and construction aggregate from demolished waste, causes a lack of market acceptance and creates a void of uncertainty. Without standards, the recycled materials lose quality, safety, and trust from the consumers and the supply chain.

The lack of regulations is partly a reason why SMEs are unable to participate in the formal CE markets and why there is a lack of investment to undertake higher order circular activities.

Market and Supply Chain Barriers

Currently, Vietnam's market for secondary materials is still underdeveloped and dominated by the informal market. There is no trading system for secondary raw materials, which includes inter-institutional by-products, agricultural waste, and post-consumer recyclables. This means there is no market for these materials, and trading will continue to occur through informal channels, which contributes to the lack of transparency in terms of pricing, quality and availability of the materials. This drives up transaction costs, which makes it unattractive for SMEs to fund large-scale investments for circular business operations. Another challenge is the behavior of the consumers. Many consumers in Vietnam do not want to buy green or recycled products, especially if they cost more than the traditional products. Because of the low demand from consumers, there is less incentive for SMEs to adopt more CE-focused business models.

5. Case Studies: Lessons from Practice

The analysis of Vietnamese SMEs and their respective case studies provides insights into the methods employed in overcoming structural challenges and the application of circular economy principles. With case studies having significant sectoral diversity, the studies capture the conditions conducive to the successful adoption of EC.

5.1. Thanh Long Bioplastics: Innovation from Agricultural By-products

Thanh Long Bioplastics illustrates the value of technological innovations in added-value processing of agricultural residues. Vietnam has one of the largest coffee export markets in the world. Consequently, the country generates enormous amounts of coffee husk waste, which has historically been disposed of or incinerated. Thanh Long Global JSC, part of the Minh Tien Group, has developed a patented process for the construction of bio composite materials through the polymerization of coffee husk fibers with other polymer materials. The firm is now able to eliminate under processed agricultural waste, while at the same exporting bioplastics (USD 99 per kilogram). The 10 million USD factory located in Bac Ninh is now one of the largest facilities in the world, producing 20,000 tons of bioplastics annually. Furthermore, the firm has recently penetrated the EU and US markets, which are the most demanding. The business model augmented rural incomes, in particular, farmers who grow coffee. The case illustrates that the agricultural supply chains where significant biomass remains unutilized, coupled with other innovative technology in materials, the greater the value and competitive advantage.

5.2. Lagom Vietnam: Solving the Collection Challenge for Difficult-to-Recycle Waste

Lagom Vietnam has been dealing with complex waste streams, such as paper milk cartons that contain paper, plastic, and aluminum, and are often ignored by informal waste collectors. Since 2019 Lagom Vietnam has developed a community collection network centered around schools and has integrated climate education. Lagom maintains a partnership with major players, such as Tetra Pak, where they obtain a large and constant supply of cleaned cartons that are then recycled and upcycled into furniture, hangers, and roofing tiles. Lagom diverts large amounts of waste while providing environmental education and awareness. With Lagom, closed loop recycling systems for municipal waste streams are integrated with climate education. Lagom also captures public climate education engagement irregularities and gaps in climate mitigation systems. Lagom Vietnam is an example of integration of complex recycling challenges having focused public private partnership, social enterprise and community engagement frameworks.

5.3. ReForm Plastic: Technology Solutions for Low-Value Plastics

ReForm Plastic demonstrates the potential impact of positive technology design on low-value plastics. These materials include thin films, multilayer packaging, and mixed waste streams. All of these materials are typically ignored due to their low value. The company aims to transform these materials into construction boards made for internal and structural applications through heat compression molding. The technology is modular and inexpensive so that local community members in Da Nang can purchase small-scale franchises. This allows local communities to participate in the plastic waste their communities have. This improves transportation emissions and helps municipalities to participate in the circulation economy. ReForm is an exceptional example of communities benefitting from the use of inexpensive pioneering technology, and sophisticated innovations in business, for otherwise disregarded waste streams.

5.4. Saitex: An International Benchmark for Sustainable Textile Manufacturing

Outside of the norm for SME manufacturers in Vietnam, Saitex illustrates the positive effects of the implementation of advanced circular technologies in the country's textile industry. Saitex is recognized as one of the 'cleanest' denim manufacturers in the industry. The company has a fully integrated closed-loop water system which allows for 98% water reuse with only a small percentage of water being evaporated. The company, however, is still able to find beneficial uses of production sludges. They combine it with clay to form non-fired bricks which is a valuable building material while cutting production waste. All these factors combined result in Saitex being able to attain savings of 5,000,000,000 Vietnam Dong, which converts these circular practices into positive financial returns. Saitex sets an example for companies with a lower level of commitment and weaker investments in driving technologies to operate at the very top of the global sustainable supply chains. She is showing Vietnamese companies how to more positively circular their production models and attain sustainable leadership.

Table 1. *Summary of Key Features Across Case Studies*

Company	Sector	Input Waste Stream	Output Products	Critical Success Factors
Thanh Long Bioplastics	Agriculture / Plastics	Coffee husk residues	Bio-composite resins	Deep-processing technology; use of local biomass resources
Lagom Viet Nam	Recycling	Paper milk cartons	Eco-furniture, hangers,	Community engagement;

	Services		roofing materials	partnerships under EPR
ReForm Plastic	Construction / Plastics	Low-value mixed plastics	Durable construction boards	Simple technology; scalable franchise model
Saitex	Textiles	Wastewater, sludge	Recycled water; non-fired bricks	Advanced technology; strong leadership commitment

6. Discussion

Vietnam demonstrates a common contradiction among developing nations experiencing a sustainability transition. Even when there are policies in place and there is more recognition of the environmental risks among the public, the adoption of circular economy practices by businesses remains patchy. This has also been noted in other developing economies whereby the micro and small enterprises (MSEs) continuously focus on short-term goals rather than on long-term environmental improvements (Geissdoerfer et al., 2020). While there is increasing promotion of the circular economy in national policies, these firms are still influenced by factors such as lack of resources, low levels of technology, and risk averse approaches to investments. This is the fundamental idea of the Dynamic Capability Theory, which argues that firms have low levels of sensing, seizing, and transforming adaptive mutation when there is radical change in the governing policies or the market. Most Vietnamese MSEs, as is the case with MSEs in Indonesia, Thailand and the Philippines, have not yet developed the capabilities required to design and implement circular innovations, thereby reinforcing a "capability trap" that constrains structural change.

Currently, the analysis indicates that institutional quality has a crucial mediating impact. Provinces such as Quang Ninh, Da Nang, and Dong Nai with more transparent and stable governance and informal cost reductions display more advanced circular experimentation and eco-innovation. This is consistent with cross-country evidence from the EU and China, where the capacity of sub-national governance has a pronounced impact on the rate of CE adoption, as evidenced by regional waste management in Spain and green industrial parks in Zhejiang. Vietnam also illustrates the core assertion of Institutional Theory: the formation of regulatory environments will influence the behavior of organizations through compliance, as well as through the establishment of ecosystems that alleviate uncertainties and transaction costs. In these provinces, SMEs are more likely to adopt new technologies, integrate into EPR systems, and participate in industrial symbiosis networks. This is particularly true where the administrative burden is lower.

An additional observation deals with the growing impact of digital transformation as a facilitator of circularity. The increase in the adoption of AI among SMEs is equally noticeable in Malaysia, Singapore, and China, where digital platforms aimed at waste traceability, materials trading, and predictive maintenance have become boons for resource efficiency. These fits discussions surrounding Ecological Modernization, positing that a technologically modernized economy, synergized with the right policies and institutions, can achieve a break in the nexus between economic growth and environmental degradation. The increasing digitalization of Vietnam, therefore, represents a particular strategic opportunity: if intertwined with the design of CE policies, digital solutions can offset the adverse impact of the policy vacuum on resource circularity, esp. in the secondary material markets, increasing transparency, reducing information asymmetry that has limited the potential of sustainable circular business models.

Evidence across multiple sectors also shows Vietnam's CE transition is structurally uneven. Several biomass resources are available in agriculture as well as food processing, yet there are no standardized systems to collect, and conversion technologies are not available on scales large enough to effect change. With regards to plastics, there is strong EPR-driven momentum but also there is a technological gulf as recyclers tend to work in the informal, and less technologically sophisticated, sector of the economy. Vertically integrated textile manufacturers and global value chains are pressurized and sustained by incurring significant costs related to the upgrading of technologies to meet sustainability requirements. In construction, the absence of technical standards for recycled aggregates is a significant barrier. These examples are same with what has been termed the 'multi-speed circular transition' in India and China, where export-oriented sectors or those with significant international purchasing pressures, such as textiles and electronics, outpace those oriented primarily to the domestic economy. Vietnam's case, therefore, strongly calls for a differentiated circular approach at the sectoral level, rather than a blanket policy.

Launching the circular economy demonstrates the importance of case studies in this research. Thanh Long Bioplastics, Lagom Vietnam, ReForm Plastic, and Saitex show that firms with high levels of entrepreneurial leadership, collaboration with partners, and the ability to learn are able to implement bioplastics-based circular innovations even in circumstances where financial constraints are significant. These businesses and related case studies of circular business models and micro-level transformations in emerging economies illustrate how firm-level initiatives can support hybrid circular strategies. Similar patterns have been observed among early circular economy adopters, such as the apparel sector in Bangladesh and community-based recycling initiatives in Brazil.

Taken together, the findings reveal that Vietnam's circular transition will hinge on closing three critical gaps:

(1) The Gap in Capabilities. SMEs will need to grow their sensing, and the innovations that will help them transform.

(2) The institutional gap, which requires the alignment of provincial and sectoral governance discrepancies for uniform execution.

and

(3) The market infrastructure gap, which requires the establishment of secondary material exchange, digital tracing systems, and standard CE technologies. Closing these gaps is critical for Vietnam to be able to shift from piecemeal, ad hoc progress to comprehensive, systemic multi pathway circular economy that is in line with global benchmarks.

7. Strategic Policy Recommendations and Implementation Roadmap

Institutional and Policy Measures

To promote Vietnam's transition to a circular economy, Vietnam's rules and policies will need to be more streamlined and flexible. One of the most important elements of this is the formulation of precise secondary-level regulations for each industry, incorporating standardized regulatory resource-efficiency and recycled product quality criteria. This will help SMEs regulatory clarity and aid in building their confidence for marketing circular products. Furthermore, the government should fast track the implementation of green public procurement policies to make the public sector a role model for bulk purchase of eco friendly and recycled products. This will create stable demand for circular economy products and lower uncertainty for SMEs in the marketplace. Likewise, the incentives for strategic use of land in Decree 08/2022/ND-CP must be swiftly implemented, in particular, the reduction or exemption of rental land for recycling and waste treatment facilities will help SMEs access legally compliant and affordable industrial estates where they can more easily scale their circular economy operations.

Financial Instruments and Investment Mobilization

To enhance the ability of SMEs to spend on the circular economy technologies and infrastructure, access to finance has to be broadened. The implementation of a targeted green credit system for SMEs, accompanied by a clear national green taxonomy, has the potential to aid commercial banks in project assessments and prioritization of sustainable (green) projects. A national green credit guarantee fund is also likely to mitigate risk perceptions and substitute for SMEs' insufficient collateral, rendering it more attractive for banks to provide medium- and long-term financing. Outside of traditional banking, Vietnam needs to embrace an even wider range of financial instruments, including green bonds, carbon credits, and blended finance. These instruments would obtain wider financing for SMEs, reduce financing costs, and speed up the financing of barriers technologies for circular production models.

Technological Development and Market Facilitation

Advancing the circular economy requires the improvement of technology and market infrastructure in Vietnam. The establishment of a national digital platform for secondary materials will foster transparent and cost-effective secondary materials market and ultimately eliminate regional disparities in supply and demand. The participation of SMEs in industrial symbiosis networks and eco- industrial parks will enable firms to optimize the utilization of infrastructures to recover and process waste materials as production input and to achieve resource self-sufficiency. Moreover, national digital transformation programs should integrate environmental management systems, for example, energy monitoring, waste traceability, life cycle data systems, and others, to ensure the digital and green transformations of the economy take place in unison. These will subsequently enhance SMEs technological capacities and, thus, their competitiveness while cascading the positive impact of circular economy initiatives to the entire Vietnam economy.

Implementation Roadmap

- **2025–2026: Initiation and Pilot Phase**

Strengthen awareness of CE principles and finalize technical guidelines for EPR implementation.
Launch pilot green credit schemes targeted at SMEs to support early-stage circular initiatives.
Implement model programs for source separation and community-based waste collection at selected localities.

- **2027–2028: Acceleration and Scaling Phase**

Operationalize a national secondary materials exchange platform to standardize transactions and improve market transparency.
Expand green public procurement across ministries and provincial authorities to create stable demand for circular products.
Develop specialized recycling clusters and eco-industrial zones to facilitate industrial symbiosis and reduce logistical constraints.

- **2029–2030: Consolidation and Integration Phase**

Achieve national targets for urban solid waste recycling, aiming for a 95% recycling rate.
Enable SMEs to participate actively in carbon markets and benefit from monetizing emissions reductions.
Position Vietnam as an exporter of circular technologies, materials, and business models under the "Made in Vietnam" sustainability brand.

8. Conclusion

The shifts in the circular economy are absolutely going to happen. For Vietnamese SMEs to stay competitive while also achieving sustainable growth in the low-carbon economy, the Viet Circular economy approach is essential. The research presented in the paper indicates that Vietnamese SMEs, despite the constraints of finances, technologies, and management, have the most potential to lead the adaptable and entrepreneurial circular economy of the country. The Bioplastics of Thanh Long, Lagom Vietnam, and ReForm Plastic have demonstrated that grassroots innovation, when appropriately supported by policy, can create a tri-fecta of positive outcomes. Certainly, the outcomes are positive economically, environmentally, and socially.

Isolated success stories alone are insufficient to drive systemic change. The Vietnamese government must demonstrate strong commitment to policy integration and regulatory harmonization to close the persistent gaps between macro-level policies and enterprise-level practices. This requires the deployment of coherent policy instruments to support digital green development, expand access to green finance, and foster a flexible market ecosystem for secondary raw materials. Across governance levels, technological integration can enhance system-wide capacity while ensuring that subnational authorities are empowered to implement circular economy initiatives alongside national strategies.

Ultimately, the most important component for the country to achieve its Net Zero 2050 and further position itself in global value chains is to close the `implementation gap` within the macro policy and micro practice. With the seamless and cohesive collaboration

from the government, the industry, and the financial institutions, Vietnam may be able to convert the principles of the circular economy into everyday business practice and open a new path of development that is both sustainable and includes growth.

Appendix: Key Macroeconomic and Environmental Indicators Related to the Circular Economy in Vietnam

Table 2. *Key Macroeconomic and Environmental Indicators (Estimated for 2023–2024)*

Indicator	Value / Status (2023–2024 Estimate)	Data Source
GDP Growth	Projected 6.1% (2024), 6.5% (2025)	World Bank
Share of SMEs (Small and Medium-Sized Enterprises)	Approximately 97% of total enterprises	Aston University Research
Daily Waste Generation	~60,000 tons/day (60% urban solid waste)	Tuoi Tre / MONRE
Global Green Economy Index Ranking	79th out of 160 countries	VCCI
Green Future Index Ranking	53rd out of 76 countries	VCCI
Plastic Waste Recycling Rate	<10% (formal sector); <30% (overall)	UNDP / World Bank
Renewable Energy Target	47% of primary energy mix by 2030	National Action Plan

Table 3. *Top 5 Provinces Leading the 2023 Provincial Green Index (PGI)*

Rank	Province / City	Key Highlights in Green Governance and Support for Businesses
1	Quang Ninh	Leads both PCI and PGI; strong administrative reforms; prioritizes high-tech investments and pollution reduction in mining areas.
2	Da Nang	Implements the "Environmental City" policy; effective urban waste management; supports green start-ups and eco-innovation.
3	Dong Nai	Major industrial hub with significant initiatives for eco-industrial parks; strict control of industrial wastewater discharge.
4	Hung Yen	Attracts environmentally friendly FDI; improved centralized wastewater treatment infrastructure in industrial zones.
5	Ho Chi Minh City	National center for finance and technology; leads in the number of circular economy and clean-tech start-ups.

Source: PCI–PGI 2023 Report, VCCI

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